Vol.74 No.2* Mar-Apr, 2017

# SVAS OBSERVER

Sacramento Valley Astronomical Society

Founded in 1945

## Just a LITTLE Snow!

Photo by Stuart Schultz

## Inside This Issue



Let's see, does HGO's roof roll off to the left or the right? If I didn't know it would be difficult to tell! Even Stuart conceded the snow was too deep for observatory access.

I really enjoy beautiful winter scenes, and with HGO and RJMO as the center piece, it couldn't get any better!

Looking forward to some great spring observing,

Observer Editor

# SVAS Event Calendar

## March 17, Fri, SVAS Annual Election Meeting, 8:00pm.

**Sacramento City College, Mohr Hall Room 3,**
**3835 Freeport Boulevard, Sacramento, CA.**
**There will be no speaker this month.**

## March 25, Sat

**Blue Canyon, weather permitting.**

## March 27, Monday

**New Moon.**

## April 21 , Fri, SVAS General Meeting, 8:00pm.

**Sacramento City College, Mohr Hall Room 3,**
**3835 Freeport Boulevard, Sacramento, CA.**

## April 22 & 29, Sat ,

**Blue Canyon, weather permitting.**
**Yes two dates this month! Let's hope the snow clears.**

## April 25, Tuesday

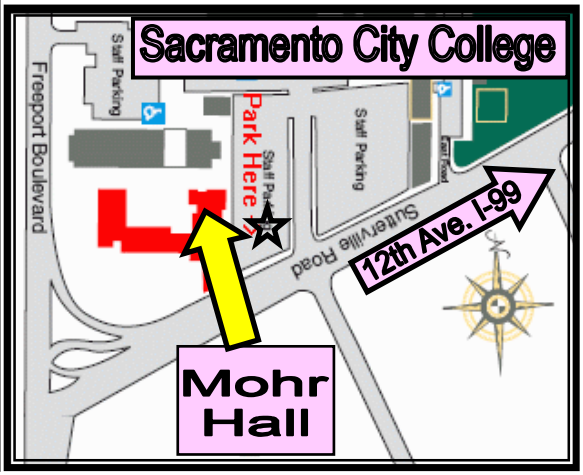
**New Moon.**

## Star Party Schedule for 2017

Mar 25
Apr 22 & 29
May 27
Jun 24
July 21-23 Star B Q
Aug 19
Sept 16 & 23
Oct 21
Nov 18
Dec 16

Star Parties

Blue Canyon




## Community Star Parties

**Contact Wayne Lord**

# SVAS Guest Speakers

**Speaker Seeker**
**Fera Zamani**
**SVAS Board**

**April 21, 2017, Bill Goff** will discuss some of the types of variables, why amateur observations are important, opportunities for pro/am collaboration and some exciting recent developments.

Bill began his venture in astronomy in the late 1950s with a small telescope observing Messier objects from his family's backyard. By the time he'd graduated from high school, he had completed grinding a mirror and made his first telescope. He has built several over the years.

In the 1980's he met some observers from the AAVSO and liked visual variable star observing right away. It offered a structured way to plan observing that he found interesting. And besides, there were many types of variable stars to observe. He's been a member ever since.

Later, as the technology improved he adopted CCD camera's, and began a path of making precision measurements of variable star brightness changes.


## May 19, 2017, Raj Dixit

will present on;

## Hubble vs. Your Scope

Raj will discuss the difference between the beautiful images you see on TV, in books & magazines, and on the internet, compared to what you actually see through a telescope!

# Getting Acquainted with the Candidates

# SVAS Board, 2017-18

## Walt Heiges
## President


## Lonnie Robinson
## Vice President


It has been another really fun year at the SVAS, and March is election month. The SVAS Board (Officers and the Board of Directors combined) is, as it should be, the heart-beat of the club. We have been very successful the past few years, supplying the leadership to make all the club activities fun and rewarding for all. We try to support all things SVAS, and highly encourage you, the membership, to join in and help where you can. Pick an activity you enjoy, whether it be school star parties, public outreach events, or HGO star parties, and get involved on a regular basis. It's so important to be a "regular", continued involvement makes our club work and helps us get to know each and every one of you! As candidates we promise to continue being responsible with your money, protecting your privacy, and taking care of club business. Most important, let's all have FUN!


# Kevin Heider for Secretary


Star-B-Q

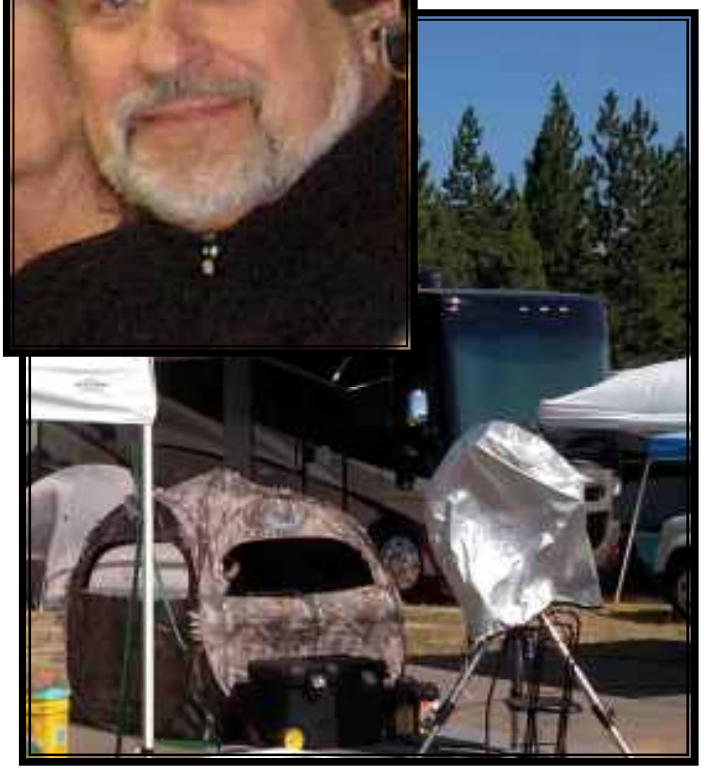
July 21-23, 2017

# Kevin Normington for Treasurer

# Odd Year Board of Director Candidates

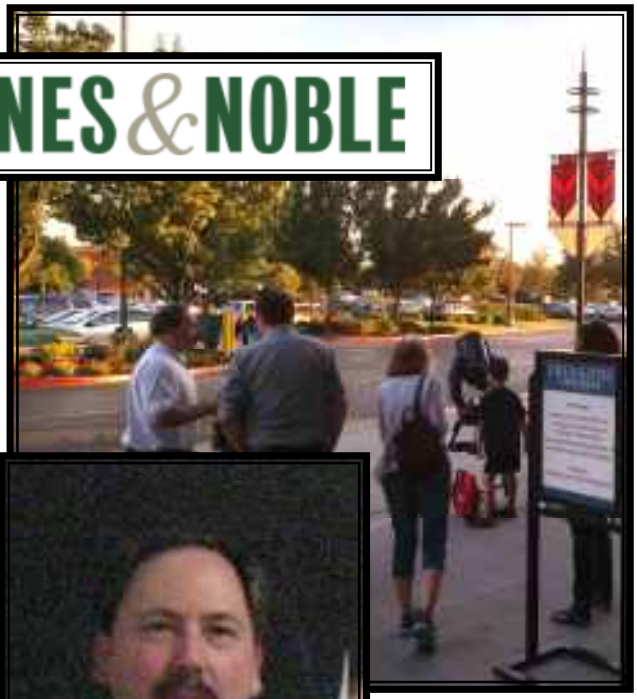
Video Astronomy

## Chuck Real



## Charles Jones

BARNES & NOBLE



## Raj Dixit

Messier Marathon

East West



## Dave Macho

# Special Mention, Not on This Years Ballet
# Even Year Board of Directors

## Perry Preston Porter

## Tom Braun


HGO

GS Guest Speakers

SVAS

Yosemite Star Party

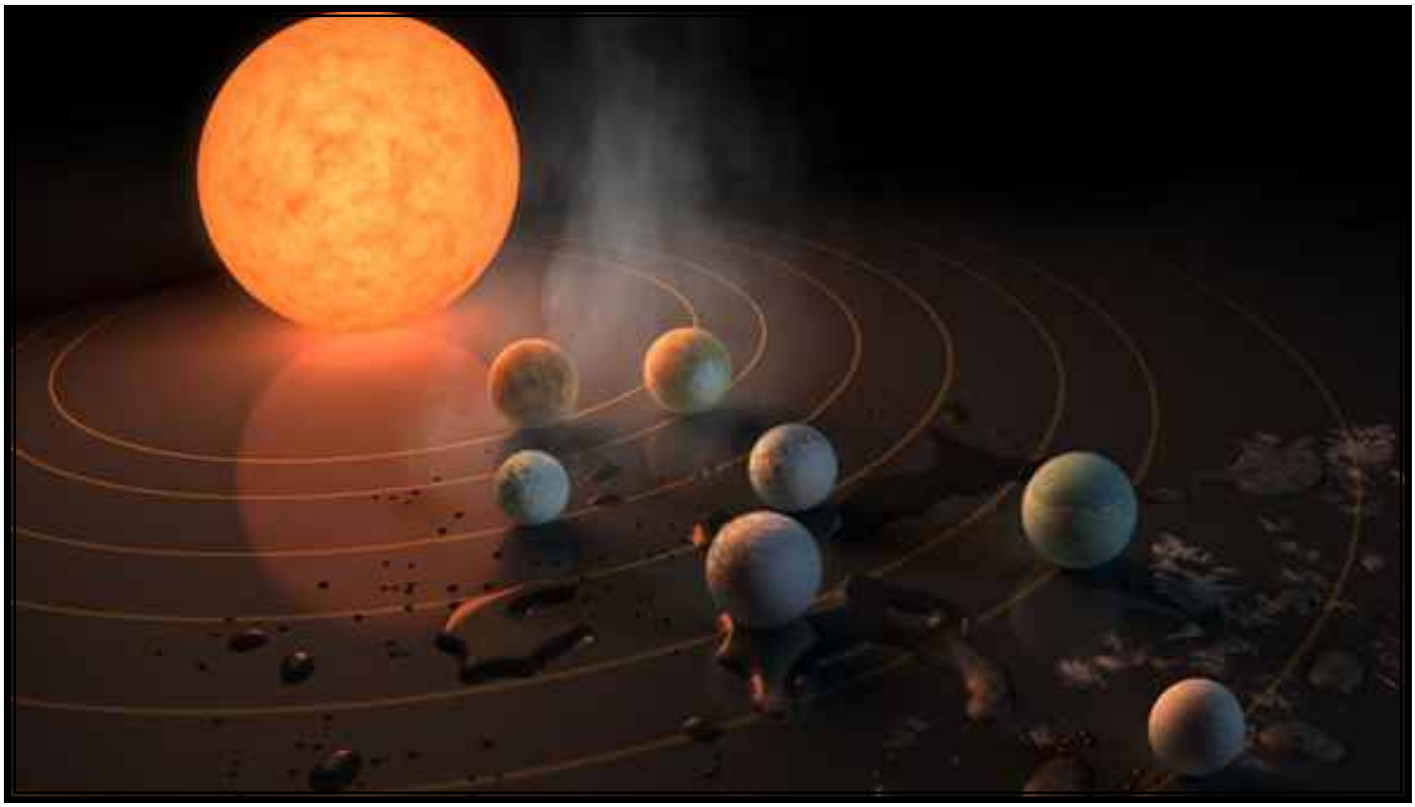
Point Glacier

SVAS

Aug 11-12

## Fera Zamani

# NASA Reveals Three Earth-Size Goldilocks-Zone Planets Around a Single Nearby Star!



NASA's Spitzer Space Telescope has revealed the first known system of seven Earth-size planets around a single star. Three of these planets are firmly located in the habitable zone, the area around the parent star where a rocky planet is most likely to have liquid water.

The discovery sets a new record for greatest number of habitable-zone planets found around a single star outside our solar system. All of these seven planets could have liquid water – key to life as we know it – under the right atmospheric conditions, but the chances are highest with the three in the habitable zone.

“This discovery could be a significant piece in the puzzle of finding habitable environments, places that are conducive to life,” said Thomas Zurbuchen, associate administrator of the agency’s Science Mission Directorate in Washington. “Answering the question ‘are we alone’ is a top science priority and finding so many planets like these for the first time in the habitable zone is a remarkable step forward toward that goal.”

**At about 40 light-years (235 trillion miles) from Earth, the system of planets is relatively close to us, in the constellation Aquarius**. Because they are located outside of our solar system, these planets are scientifically known as exoplanets.

This exoplanet system is called TRAPPIST-1, named for The **Transiting Planets and Planetesimals Small Telescope (TRAPPIST)** in Chile. In may, 2016, researchers using TRAPPIST announced they had discovered three planets in the system. Assisted by several ground-based telescopes, including the European Southern Observatory's Very Large Telescope, Spitzer confirmed the existence of two of these planets and discovered five additional ones, increasing the number of known planets in the system to seven.

The new results were published Wednesday in the journal Nature, and announced at a news briefing at NASA Headquarters in Washington.

Using Spitzer data, the team precisely measured the sizes of the seven planets and developed first estimates of the masses of six of them, allowing their density to be estimated.


Based on their densities, all of the TRAPPIST-1 planets are likely to be rocky. Further observations will not only help determine whether they are rich in water, but also possibly reveal whether any could have liquid water on their surfaces. The mass of the seventh and farthest exoplanet has not yet been estimated – scientists believe it could be an icy, "snowball-like" world, but further observations are needed.

"The seven wonders of TRAPPIST-1 are the first Earth-size planets that have been found orbiting this kind of star," said Michael Gillon, lead author of the paper and the principal investigator of the TRAPPIST exoplanet survey at the University of Liege, Belgium. "It is also the best target yet for studying the atmospheres of potentially habitable, Earth-size worlds."

**In contrast to our sun, the TRAPPIST-1 star – classified as an ultra-cool dwarf** – is so cool that liquid water could survive on planets orbiting very close to it, closer than is possible on planets in our solar system. All seven of the TRAPPIST-1 planetary orbits are closer to their host star than Mercury is to our sun. The planets also are very close to each other. If a person was standing on one of the planet's surface, they could gaze up and potentially see geological features or clouds of neighboring worlds, which would sometimes appear larger than the moon in Earth's sky.

**The planets may also be tidally locked to their star, which means the same side of the planet is always facing the star, therefore each side is either perpetual day or night.** This could mean they have weather patterns totally unlike those on Earth, such as strong winds blowing from the day side to the night side, and extreme temperature changes.

Spitzer, an infrared telescope that trails Earth as it orbits the sun, was well-suited for studying TRAPPIST-1 because the star glows brightest in infrared light, whose wavelengths are longer than the eye can see. In the fall of 2016, Spitzer observed TRAPPIST-1 nearly continuously for 500 hours. Spitzer is uniquely positioned in its orbit to observe enough crossing – transits – of the planets in front of the host star to reveal the complex architecture of the system. Engineers optimized Spitzer's ability to observe transiting planets during Spitzer's "warm mission," which began after the spacecraft's coolant ran out as planned after the first five years of operations.

"This is the most exciting result I have seen in the 14 years of Spitzer operations," said Sean Carey, manager of NASA's Spitzer Science Center at Caltech/IPAC in Pasadena, California. "Spitzer will follow up in the fall to further refine our understanding of these planets so that the James Webb Space Telescope can follow up. More observations of the system are sure to reveal more secrets."

Following up on the Spitzer discovery, NASA's Hubble Space Telescope has initiated the screening of four of the planets, including the three inside the habitable zone. These observations aim at assessing the presence of puffy, hydrogen-dominated atmospheres, typical for gaseous worlds like Neptune, around these planets.

In May 2016, the Hubble team observed the two innermost planets, and found no evidence for such puffy atmospheres. This strengthened the case that the planets closest to the star are rocky in nature.

"The TRAPPIST-1 system provides one of the best opportunities in the next decade to study the atmospheres around Earth-size planets," said Nikole Lewis, co-leader of the Hubble study and astronomer at the Space Telescope Science Institute in Baltimore, Maryland. NASA's planet-hunting Kepler space telescope also is studying the TRAPPIST-1 system, making measurements of the star's minuscule changes in brightness due to transiting planets. Operating as the K2 mission, the spacecraft's observations will allow astronomers to refine the properties of the known planets, as well as search for additional planets in the system. The K2 observations conclude in early March and will be made available on the public archive.

Spitzer, Hubble, and Kepler will help astronomers plan for follow-up studies using NASA's upcoming James Webb Space Telescope, launching in 2018. With much greater sensitivity, Webb will be able to detect the chemical fingerprints of water, methane, oxygen, ozone, and other components of a planet's atmosphere. Webb also will analyze planets' temperatures and surface pressures – key factors in assessing their habitability.

NASA's Jet Propulsion Laboratory (JPL) in Pasadena, California, manages the Spitzer Space Telescope mission for NASA's Science Mission Directorate. Science operations are conducted at the Spitzer Science Center, at Caltech, in Pasadena, California. Spacecraft operations are based at Lockheed Martin Space Systems Company, Littleton, Colorado. Data are archived at the Infrared Science Archive housed at Caltech/IPAC. Caltech manages JPL for NASA.

# Hubble Sees the Beautiful Galaxy IC 335

This new NASA/ESA Hubble Space Telescope image shows the galaxy IC 335 in front of a backdrop of distant galaxies. IC 335 is part of a galaxy group containing three other galaxies, and located in the Fornax Galaxy Cluster 60 million light-years away.

As seen in this image, the disk of IC 335 appears edge-on from the vantage point of Earth. This makes it harder for astronomers to classify it, as most of the characteristics of a galaxy's morphology, the arms of a spiral or the bar across the center, are only visible on its face. Still, the 45 000 light-year-long galaxy could be classified as an S0 type.

These lenticular galaxies are an intermediate state in galaxy morphological classification schemes between true spiral and elliptical galaxies. They have a thin stellar disk and a bulge, like spiral galaxies, but in contrast to typical spiral galaxies they have used up most of the interstellar medium. Only a few new stars can be created out of the material that is left and the star formation rate is very low. Hence, the population of stars in S0 galaxies consists mainly of aging stars, very similar to the star population in elliptical galaxies.

As S0 galaxies have only ill-defined spiral arms they are easily mistaken for elliptical galaxies if they are seen inclined face-on or edge-on as IC 335 here. And indeed, despite the morphological differences between S0 and elliptical class galaxies, they share some common characteristics, like typical sizes and spectral features.

Both classes are also deemed "early-type" galaxies, because they are evolving passively. However, while elliptical galaxies may be passively evolving when we observe them, they have usually had violent interactions with other galaxies in their past. In contrast, S0 galaxies are either aging and fading spiral galaxies, which never had any interactions with other galaxies, or they are the aging result of a single merger between two spiral galaxies in the past. The exact nature of these galaxies is still a matter of debate.

***IN Fornax, European Space Agency Credit: ESA/Hubble and NASA***

# Bill Thomas, NcA
# Jeff Baldwin, SaS
# Lonnie Robinson, SVAS


Monday, Feb 20, the ATM Connection got together for a really fun day of everything mirror making. We met at my house which is conveniently centrally located between Stockton and Colfax. Our goals were to divide and share a 44 pound tub of CEO (a very expensive mirror polishing compound), and discuss and demonstrate the Zambuto method of figuring mirrors. As I mentioned in the last newsletter, Zambuto is famous for his ultra smooth mirrors, and best of all he is willing to share his process with the ATM community. It is our goal to integrate the best of his process with some other tried and true methods of our own, to produce very smooth and accurate mirrors. It's a great feeling to have all this talent as close as a phone call for any needed consult.

From left to right; Mike Laveri (a Stockton area optitician and working on a really large fast mirror and telescope with Jeff Baldwin), Jack Sales (Dark Sky Association and past SVAS Board Member, working on his 16" mirror), Jeff Baldwin (Stockton Astronomical Society "SAS" Vice President and mirror maker extraordinar) My friend Paul Redmon (We just finished his 12.5" mirror and telescope), another good friend John Griffin (president of the Nevada County Astronomers, NcA, working with Bill Thomas on an 11" mirror and telescope). Yours truly Lonnie Robinson (SVAS Vice President, ATM, and Newsletter), and last but certainly not least Bill Thomas (NcA and SVAS ATM, and fellow mirror and telescope maker). Missing in the group photo is Bill Hagbery, I just finished his 16" mirror rework.

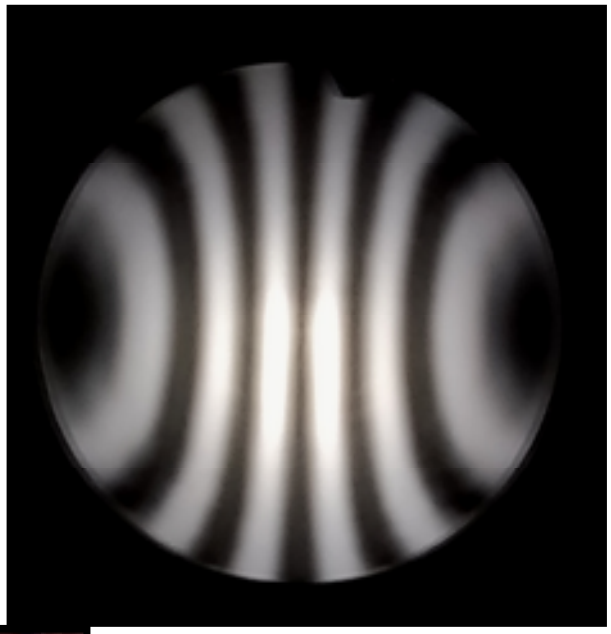
It was a great experience having both my mentors, Jeff Baldwin and Bill Thomas, together in the same room discussing mirror figuring procedures. I always have a lot to learn, and these guys definitely have a lot of knowledge and experience to offer. Indeed, it's a bit intimidating to act like I know what I'm talking about with these guys keep-

ing me accurate! I thank them again for being so patient with me! We enjoyed a late afternoon lunch at Applebee's, (great hamburgers, I recommend the American Standard with mushrooms and no pickles!) and continued talking ATM for another hour or so. Everyone except Jeff and Mike departed for home after lunch, the weather was getting more severe by the minute.

Jeff brought his new Bath Interferometer to show us, we just didn't have time earlier. He set things up on a small mirror, went through the alignment process, and took an interferogram.

The photo at left is Jeff looking for the return beam for alignment. The second photo is the laser mount, beam splitter, and a lens glued to the beam splitter that spreads the light over the entire mirror. We all agree the Bath just isn't dependable enough for large fast mirrors, and Jeff and Bill just bought the optics for a Ceravolo Interferometer. Stay tuned, we are hoping this will be the last word for final figuring a mirror's entire surface. Jeff and Mike left soon after, facing a long drive home in rough weather.

I finished working Bill Hagbery's 16" mirror this month (he is at the right in the photo below). It was a long process, because I learned how to test and work the whole mirror instead of just one axis (like doing four mirrors at once!). I did four SIT tests on different axis's, producing an accurate surface profile of eight different ranges (edge to center) covering the whole mirror. Then I reworked the very small highs and lows of each area separately, while the mirror curve was sitting at the high maximum tolerance of the LaCroix chart. After all the ranges were equally corrected, I brought the overall curve smoothly down to tolerance. It's now time for a star test, and I cut some short "temporary truss poles", made from ABS tubing (easy to adjust the length and cheap to replace), for Bill's 16" f/4.5 (mine is a 16" f/5) that will work with my telescope. Then we can star test Bill's



mirror in my scope, and if the images are as expected, it will be shipped off to the coater for aluminumizing. The edge has a great diffraction "ring of fire" around the whole parameter called a balanced edge (indicating it is good), and as you can see the Ronchi lines show a very smooth curve progression without any evidence of a turned edge.

Tell me about your telescope projects. If I can be of any help, just let me know.

Lonnie Robinson

# Solar Eclipse Provides Coronal Glimpse

by Marcus Woo


On August 21, 2017, North Americans will enjoy a rare treat: The first total solar eclipse visible from the continent since 1979. The sky will darken and the temperature will drop, in one of the most dramatic cosmic events on Earth. It could be a once-in-a-lifetime show indeed. But it will also be an opportunity to do some science.

Only during an eclipse, when the moon blocks the light from the sun's surface, does the sun's corona fully reveal itself. The corona is the hot and wispy atmosphere of the sun, extending far beyond the solar disk. But it's relatively dim, merely as bright as the full moon at night. The glaring sun, about a million times brighter, renders the corona invisible.

"The beauty of eclipse observations is that they are, at present, the only opportunity where one can observe the corona [in visible light] starting from the solar surface out to several solar radii," says Shadia Habbal, an astronomer at the University of Hawaii. To study the corona, she's traveled the world having experienced 14 total eclipses (she missed only five due to weather). This summer, she and her team will set up identical imaging systems and spectrometers at five locations along the path of totality, collecting data that's normally impossible to get.

Ground-based coronagraphs, instruments designed to study the corona by blocking the sun, can't view the full extent of the corona. Solar space-based telescopes don't have the spectrographs needed to measure how the temperatures vary throughout the corona. These temperature variations show how the sun's chemical composition is distributed—crucial information for solving one of long-standing mysteries about the corona: how it gets so hot.

While the sun's surface is ~9980 Farenheit (~5800 Kelvin), the corona can reach several millions of degrees Farenheit. Researchers have proposed many explanations involving magneto-acoustic waves and the dissipation of magnetic fields, but none can account for the wide-ranging temperature distribution in the corona, Habbal says.

You too can contribute to science through one of several citizen science projects. For example, you can also help study the corona through the Citizen CATE experiment; help produce a high definition, time-expanded video of the eclipse; use your ham radio to probe how an eclipse affects the propagation of radio waves in the ionosphere; or even observe how wildlife responds to such a unique event.

Otherwise, Habbal still encourages everyone to experience the eclipse. Never look directly at the sun, of course (find more safety guidelines here: https://eclipse2017.nasa.gov/safety). But during the approximately 2.5 minutes of totality, you may remove your safety glasses and watch the eclipse directly—only then can you see the glorious corona. So enjoy the show. The next one visible from North America won't be until 2024.

For more information about the upcoming eclipse, please see:

**NASA Eclipse citizen science page**
https://eclipse2017.nasa.gov/citizen-science

**NASA Eclipse safety guidelines**
https://eclipse2017.nasa.gov/safety

Want to teach kids about eclipses? Go to the NASA Space Place and see our article on solar and lunar eclipses!
http://spaceplace.nasa.gov/eclipses/

# Solar Eclipse

# August 21, 2017

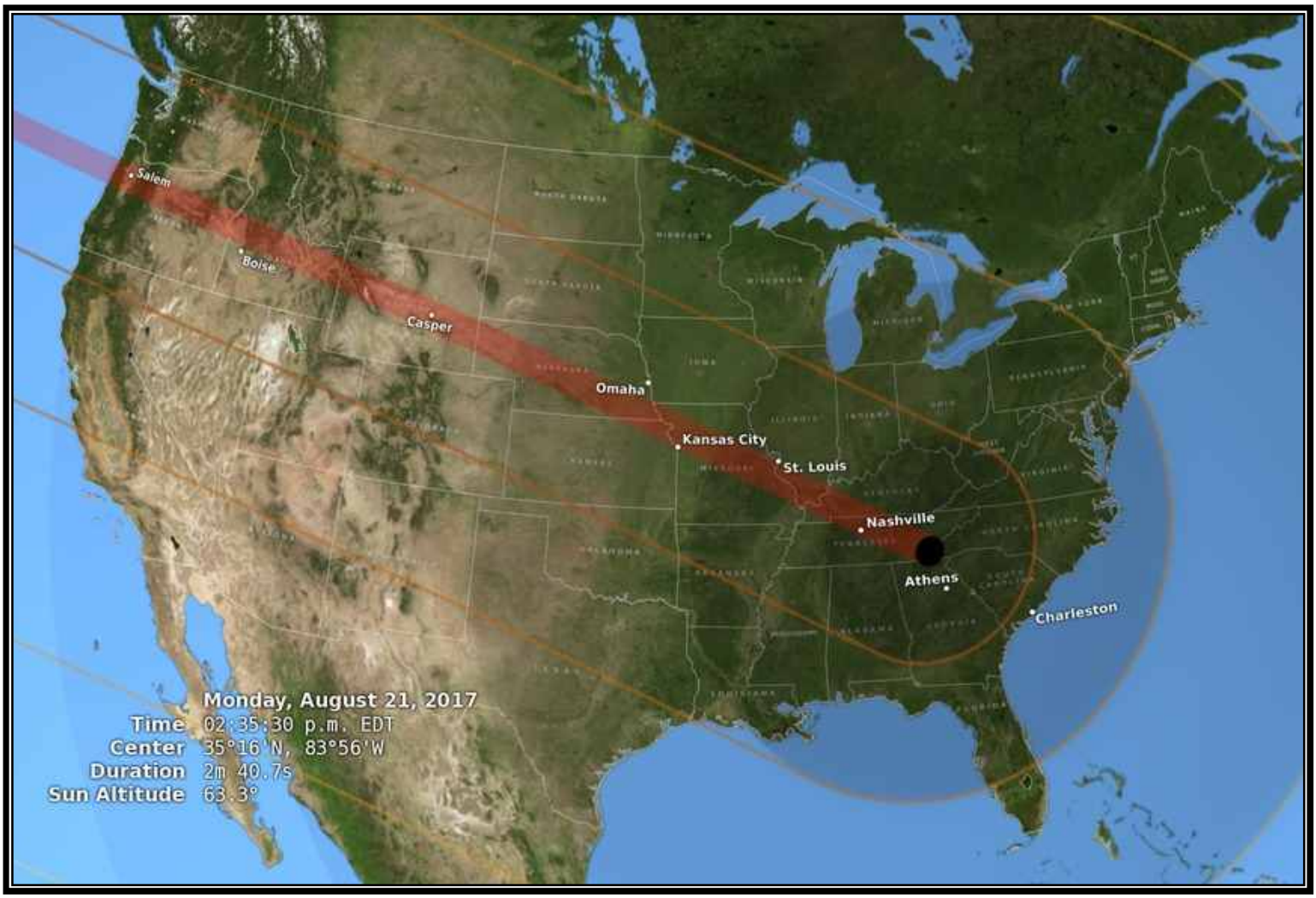



*Illustration showing the United States during the total solar eclipse of August 21, 2017, with the umbra (black oval), penumbra (concentric shaded ovals), and path of totality (red) through or very near several major cities. Credit: Goddard Science Visualization Studio, NASA*

# SVAS Main Events

International Sun-Day at Powerhouse Science Center
Sat & Sunday, June!
SVAS

SVAS
July
Rusch Park
Family Camp Out

Citrus Heights Sunday Funday
SVAS
September
Rusch Park
11:00am - 3:00pm

Star-B-Q
July 21-23, 2017

Yosemite
Star Party
Glacier Point
SVAS

Messier Marathon
East SVAS West
Aug 11-12

Community Star Parties
Contact Wayne Lord
star_geezer@yahoo.com
916-396-7404

## SVAS Sponsors!

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by Woodland Hills Camera & Telestopes

OPT Telescopes
800-483-6287

STELLARVUE

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Affordable, Quality Products for the Astronomy Enthusiast

# SVAS Officers

**President** — *Walt Heiges*

**Vice President** — *Lonnie Robinson*

**Secretary** — *Kevin Heider*

**Treasurer** — *Kevin Normington*

**Past President** — *Ross Gorman*

## SVAS Board of Directors

~ Even Year Term ~

*Perry Preston Porter*, *Tom Braun*, *Fera Zamani*

~ Odd Year Term ~

*Chuck Real*, *Charles Jones*, *David Macho*

***Please visit SVAS.Org for contact Information***

## Committees

| | |
|---|---|
| Membership / New Members | Walt Heiges / Kevin Normington |
| Star-B-Q & Resources | Walt Heiges |
| Yosemite Star Party | Tom Braun |
| Newsletter Editors | Lonnie Robinson / Walt Heiges |
| Speaker Seeker | Fera Zamani |
| SVAS Web Site | Gary Shuluk / Walt Heiges |
| Public Outreach Director | Walt Heiges |
| Community Star Parties | Wayne Lord |
| Observatory Director | Perry Preston Porter |
| Help for Beginners | Perry Preston Porter |
| HGO Maintenance Director | Stuart Schulz |
| Amateur Telescope Making | Lonnie Robinson / Bill Thomas |
| Scholarships | Chuck Real / Kevin Normington |

# Where We Meet

**General Meetings** the third Friday of each month beginning at 8:00pm.
**Board Meetings** begin at 6:30 on the same day. All members are welcome.
**Star Parties** on weekends nearest the new Moon.

Sacramento City College
Mohr Hall Room 3
3835 Freeport Boulevard
Sacramento, CA. 95822
(12th St. Exit West off I-99)
**WWW.SVAS.ORG**

# SVAS Observer - Newsletter

**To Subscribe–** First send in your membership application form below, with your dues, and upon approval by the Board of Directors the Observer newsletter (published bi-monthly beginning January) will be sent to your supplied email address in .pdf format. Second, request to join the SVAS Yahoo Group at http://groups-yahoo.com/group/svas-members. This group will keep you informed with the day to day current events and discussions.

**Articles–** Manuscripts and letters are welcome in MS Word, MS Publisher, or plain text format, and emailed to the SVAS Editor. Submission deadline is the 15th of the newsletter release month.

**Advertising–** Commercial, non-personal advertising, business card, and full page are available. Classified advertising is free to SVAS members.

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# SVAS Membership Application

**Date**___/ ___ /___ **Membership** *(check one)* **New:** ___ **or Renew:**___

**Annual Renewal Month is June (Expires July 1st)**

*(Four months minimum membership is requested, please include the following year if necessary)*

| | | |
|---|---|---|
| **General Member** *(Family–Individual)* | *Prorate @ $3 per month* | **$36 per yr** _____ |
| **Observatory Member** *(Please read Observatory Membership)* | *Prorate @ $7 per month* | **$84 per yr** _____ *(General Membership included)* |
| **Student Member** *(ID required)* | *Prorate @ $2 per month* | **$24 per yr** _____ |

**Additional Tax Deductible Contribution $** _____

**Total Enclosed Amount $** _____

**Print Name**_____

**Address**_____

**City** _____ **Zip**_____

**Phone**_____ *(E-mail required for newsletter mailing)*

**E-mail**_____

**Signature**_____

### Observatory Membership

Observatory Membership offers the benefits of a regular membership plus the private use of the Henry Grieb Observatory (HGO) at Blue Canyon. **To apply, you must have been a general member for six months or longer, be certified and approved by the Observatory Director, and then approved by the SVAS Board of Directors.**

**Please allow 30 Days Or More for Application Approval**

By signing this application, I acknowledge I have accessed the SVAS website **SVAS.org**, read and understand the SVAS bylaws and the rules governing the USFS Special Use Permit. In doing so, I agree to abide by the respective "terms and conditions" of each as they relate to using the SVAS property and facilities. I further understand and acknowledge that failure to abide by these "terms and conditions" can result in revocation of use privileges and/or SVAS membership.

**Detach, *SIGN*, & mail with payment.**

**To: SVAS Membership Application**
**PO Box 15274**
**Sacramento, California. 95851-0274**